299-W11-70 (A7312)

Log Data Report

Borehole Information:

Borehole:	299-W11-70 (A7312)		Site:	Inside the 216-T-26 Crib	
Coordinates (Plant)		GWL (ft)[1]:	Not available	GWL Date:	
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
566932	136392	May 1955	670 ft	150	

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel	2.0		8.0		0	100
Steel			6.0	~0.25	0	150

Borehole Notes:

Casing stickup is 2.0 ft.

Logging Equipment Information:

Logging System:	Gamma 2B		Type: SGLS (35%)
Calibration Date:	09/00	Calibration Reference:	GJO-2001-245-TAR
		Logging Procedure:	MAC-HGLP 1.6.5

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5	6
Date	6/13/01	6/14/01	6/14/01	6/14/01	6/14/01	6/14/01
Logging Engineer	Musial/Spatz	Musial/Spatz	Musial/Spatz	Musial/Spatz	Musial/Spatz	Pearson
Start Depth (ft)	150.5	97.0	92.0	92.0	72.5	21.0
Finish Depth (ft)	96.0	91.0	86.0	71.5	21.5	2.0
Count Time (sec)	100	100	30	100	30	100
Live/Real	L	L	R	L	R	L
Shield (Y/N)	N	N	N	N	N	N
MSA Interval (ft)	0.5	0.5	0.5	0.5	0.5	0.5
ft/min	n/a	n/a	n/a	n/a	n/a	n/a
Pre-Verification	B0000CAB	B0001CAB	B0001CAB	B0001CAB	B0001CAB	B0001CAB
Start File	B0000000	B0001000	B0001013	B0001026	B0001068	B0001171
Finish File	B0000109	B0001012	B0001025	B0001067	B0001170	B0001209
Post-Verification	B0000CAA	B0001CAA	B0001CAA	B0001CAA	B0001CAA	B0001CAA

Logging Operation Notes:

Zero reference is the top of casing. Depth return error on logging run 1 was negligible and 0.05 ft (high) on the other runs. Data acquired from about 58.5 to about 22.0 ft are unusable. ^{137}Cs was detected at 124 ft, and ^{60}Co was detected at 149 ft. Dead time increases at 100 ft. Europium was detected at 95 ft. Dead time was greater than 50 percent at 91 ft, and less than 50 percent at 86 ft. Dead time was greater than 50 percent at 72.5 ft. Count times were reduced to 30 seconds (real time) in the intervals from 92 to 86 ft and 72.5 to 21.5 ft. These decreases in count times provided a log record in the interval where system dead time was excessive.

Analysis Notes:

Analyst:	Sobczyk	**Date:**	08/07/01	**Reference:**	MAC-VZCP 1.7.9 Rev. 2

The pre-run and post-run verification spectra were evaluated and found to be within acceptance criteria. Individual spectra were processed in batch mode using APTEC Supervisor. Concentrations were calculated in EXCEL, using parameters determined from analysis of calibration data collected in August 2000. The casing configuration was described in WHC-SD-EN-TI-021. Casing thicknesses of 0.322 in. and 0.28 in. were assumed for the 8-in. and the 6-in. casings, respectively. These are published values for ASTM schedule-40 steel pipe, a commonly used casing material. The 6-in. casing has a stickup of 2.0 ft and a measured thickness of about 1/4 in. Zero reference is the top of the casing. No water correction was needed or applied.

Dead time was greater than 40 percent from 21 to 94 ft, and data from this region are considered unreliable. Dead time corrections were required where the tool was not saturated. At dead time greater than 40 percent, peak spreading and pulse pile-up effects may result in underestimation of activities. This effect is not entirely corrected by the dead time correction, and the extent of error increases with increasing dead time.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides (^{137}Cs, ^{60}Co, ^{154}Eu, and ^{152}Eu). For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable activity (MDA) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing and water corrections. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation.

Results and Interpretations:

The man-made radionuclides ^{137}Cs, ^{60}Co, ^{152}Eu, and ^{154}Eu were detected in this borehole. ^{137}Cs occurred between 3.5 and 6.0 ft at concentrations of about 1 pCi/g or less. ^{137}Cs occurred between 16 and 127.5 ft. In this interval, activities exceeded 1,000 pCi/g between 21 and 93 ft. ^{154}Eu occurred between 37.5 and 41 ft at activities of more than 10 pCi/g, and between 63.5 and 96 ft. In portions of this deeper zone, ^{154}Eu activities exceed 100 pCi/g, and ^{152}Eu is present with activities ranging up to about 5 pCi/g. ^{60}Co was present between 93.5 and 101 ft and between 123 and 149.5 ft at activities of about 0.5 pCi/g or less. The high gamma activity between 21 and 101 ft is attributed to ^{137}Cs activities greater than 1,000 pCi/g. ^{154}Eu and ^{152}Eu are probably present in this entire zone but were observed only from 37.5 to 41 ft and 63.5 to 96 ft, due to the high dead time. In addition, ^{60}Co was observed in the intervals from 93.5 to 101 ft and 137 to 149.5 ft. ^{60}Co may also be present higher in the borehole, but was not observed to the high recorded dead time due to the high levels of ^{137}Cs activity. Europium is considered as being relatively immobile, but it has reached depths of about 97 ft.

On the basis of low ^{40}K activities, the carbonate-rich paleosols of the Pliocene-Pleistocene are interpreted as being between 100 and 117 ft. In addition, a caliche layer with characteristically high uranium content (greater than 1.0 pCi/g) is present between 114 and 117 ft. The top of the Ringold is picked at 117 ft.

Because of the high activities encountered by the SGLS, the interval between 20 and 94 ft should be logged with the High Rate Logging System.

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[1] GWL – groundwater level
[2] TOC – top of casing

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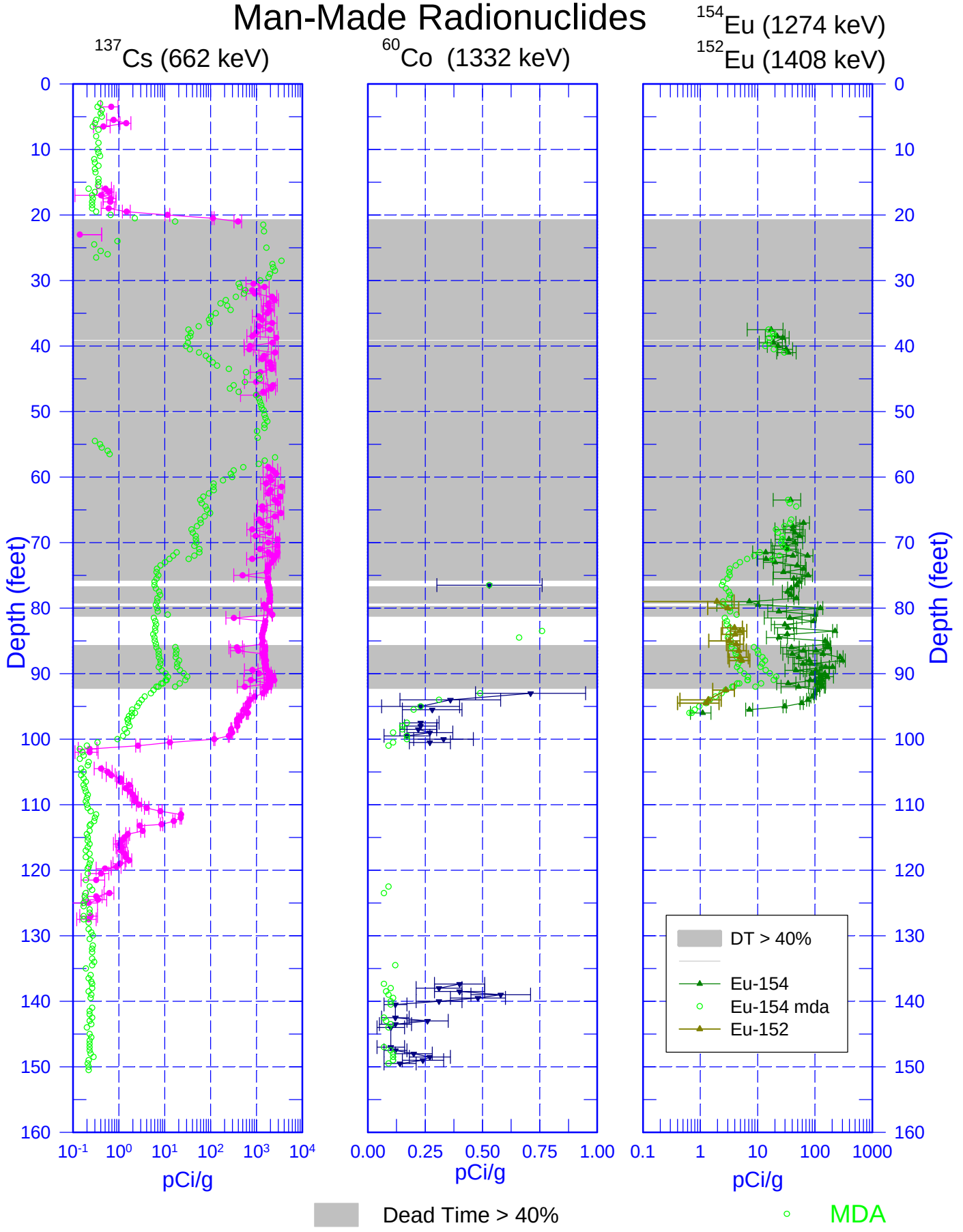
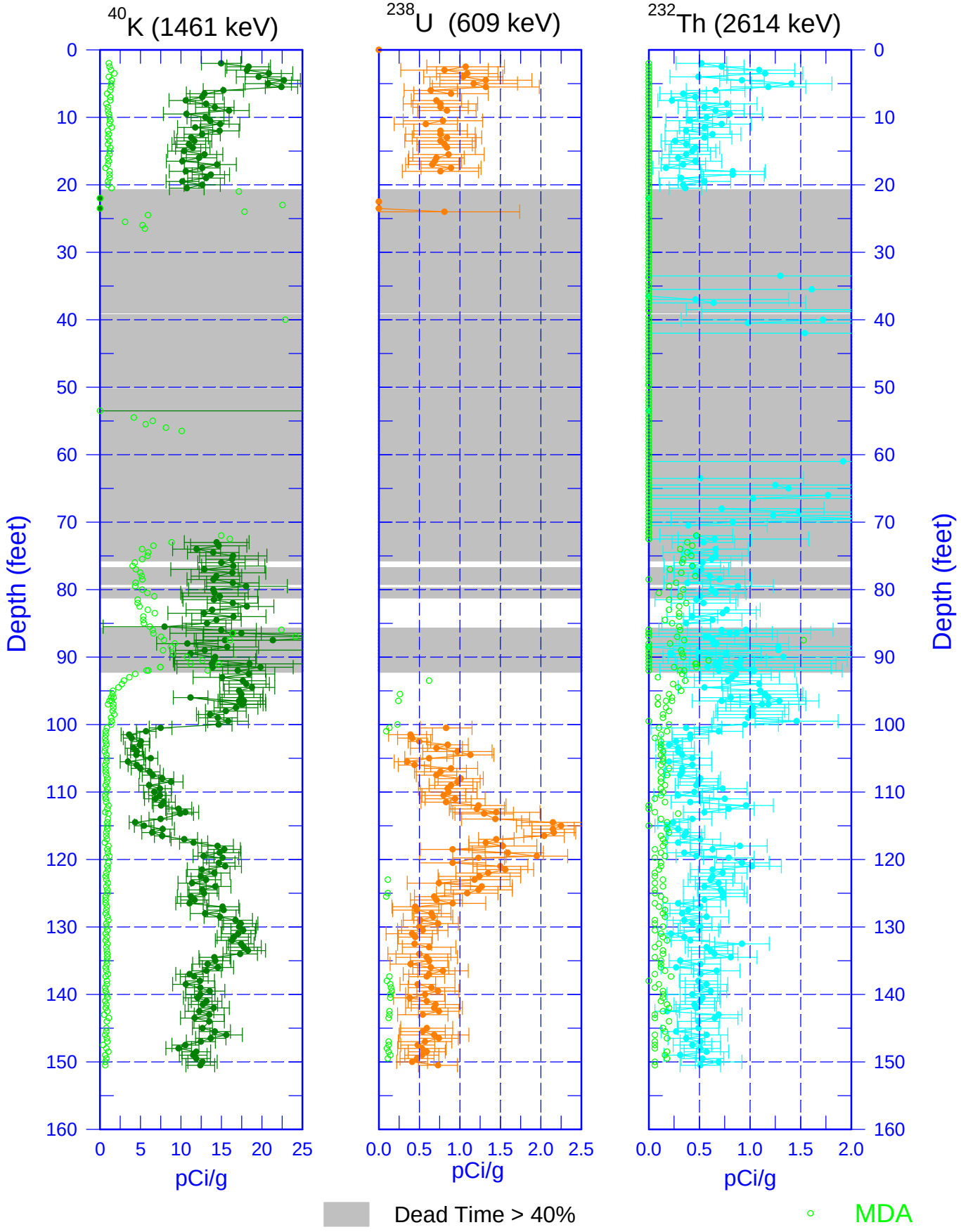
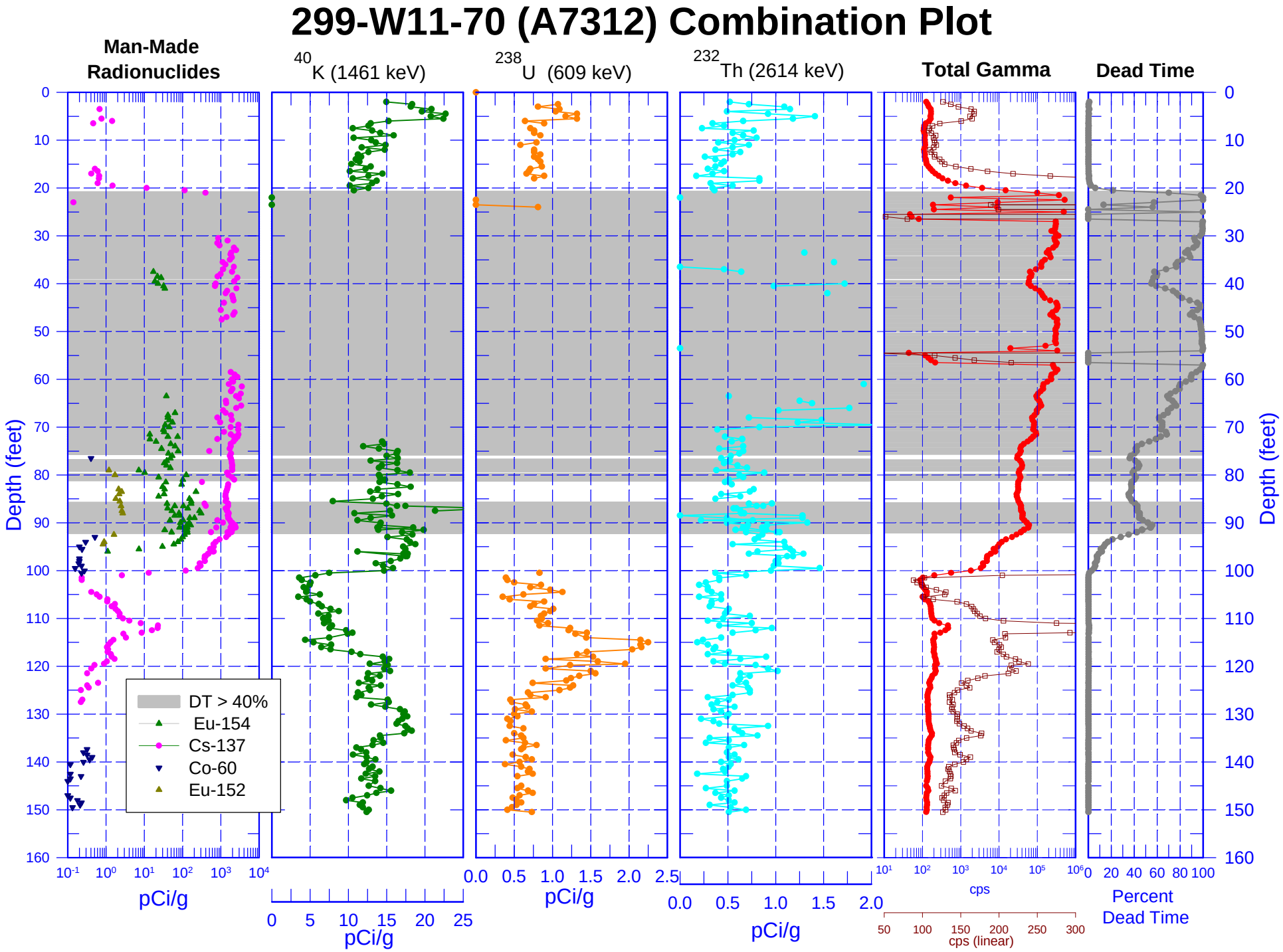
Man-Made Radionuclides

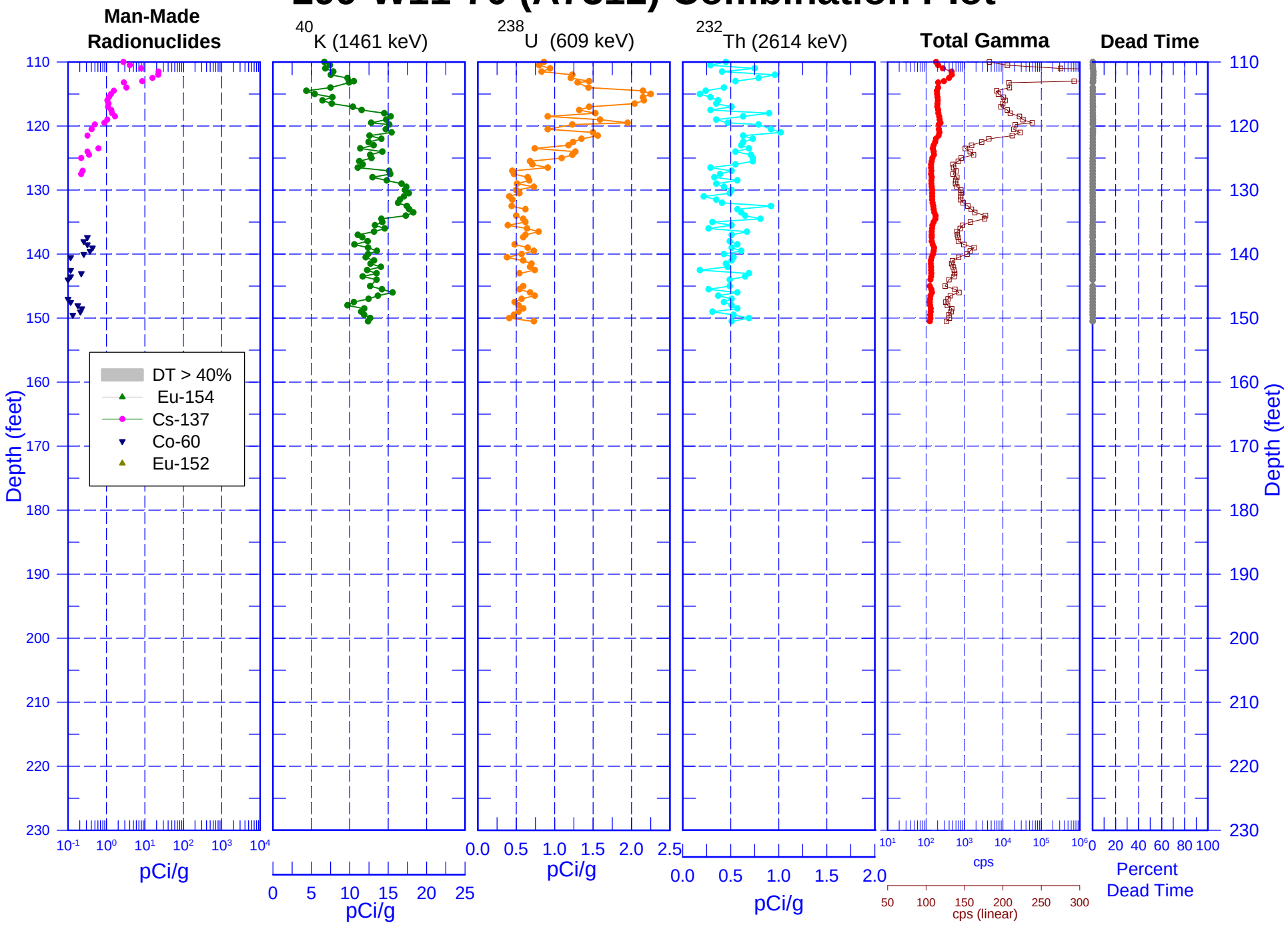


299-W11-70 (A7312)
Natural Gamma Logs




299-W11-70 (A7312) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (609 keV)
232Th (2614 keV)
Total Gamma
Dead Time
Depth (feet)
DT > 40%
Eu-154
Cs-137
Co-60
Eu-152
pCi/g
cps
cps (linear)
Percent Dead Time

299-W11-70 (A7312) Combination Plot



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Total Gamma & Dead Time